

consuming conventional methods of antibody production. Genes coding for antibody fragments that are responsible for antibody binding can be isolated and cloned into vectors that allow the recombinant antibody fragments to be displayed on the surface of phage. Those that bind antigen, and the genes they contain, can be isolated from libraries of millions of different specificities. The power of the technique to increase the speed of production, increase the diversity of specificities available and the ability to fine tune the affinities and specificities of antigen binding by manipulating the isolated gene sequences is impressive.

This section of the volume is completed by a number of chapters which consider specific examples of serological studies. These include the use of a monoclonal-antibody-based immuno-dot assay for a braconid parasitoid of the corn earworm, use of a monoclonal antibody to examine predation of cotton bollworm eggs in field crops in India, use of monoclonal antibody techniques to detect predators of whiteflies and predators of pink bollworm in the USA and use of polyclonal and monoclonal techniques to examine slug predation.

An important consideration in this field is the extent to which assay data can be converted into ecologically useful information. Indeed, as indicated by the contents of this volume, there is a wealth of technology which enables one to detect insect proteins. It is tempting to suggest that this technology appears to have outstripped the ability to interpret the findings. A thought-provoking assessment of the interpretation of such studies by Sunderland rightly highlights such issues and, for instance, makes the distinction between consumption rate and predation rate; essential reading for anyone considering using such techniques.

A number of chapters effectively update the reader on the electrophoretic techniques which were the subject of the previous symposium. An illuminating opening chapter focuses on biochemical methods for species identification in groups of pest insects that are notoriously rich in sibling species, where species identification in immature stages is difficult on morphological grounds and on the analysis of population structure and intraspecific differentiation. This section is completed with two papers that review the use of electrophoretic techniques to examine esterase polymorphism in US populations of the cotton bollweevil and in the study of predator-prey relationships. The volume is completed with a chapter by Langley which details practical techniques for determining the age and nutritional status of tsetse flies.

It is a pity that the book is not sub-divided into sections. The distribution of chapters seems a little arbitrary in places and the reader might have expected topics to be grouped rather more tightly. These minor quibbles aside, this excellent book contains a wealth of information of value to applied entomologists, ecologists and all those involved in pest management. The

symposium organisers and editors are to be congratulated on a very useful and timely volume.

Alan R. McCaffery

Induced responses to herbivory. ed. R. Karban & I. T. Baldwin, The University of Chicago Press, Chicago, 1997, ix + 319 pp., price US\$27.95, UK£14.25. ISBN 0 226 42496 0.

This is a stimulating and authoritative book written by two pioneers of the subject. Induced defence against attack by herbivorous animals is currently one of the most exciting areas of natural science, and a book that so well encompasses the subject in such a readable and compact form is essential for libraries and individuals concerned with any aspect of plant science, not least crop protection. There are six chapters, the first providing an introduction to the phenomenology of induction, with definitions of induced response, resistance and defence. There is also a brief history of what is none the less a very young subject. The next chapter describes how plants perceive damage and discusses the specificity of the processes involved. A table of signals that are proposed to operate within plants, giving possible roles and evidence for their existence, is an invaluable component and includes early studies on the oligosaccharide fragments and recent developments with salicylic acid and jasmonic acid. This chapter becomes even more useful when it discusses, in a critical and informed fashion, communication between individual plants. The chapter concludes that there is increasing evidence of volatile cues released by damaged plants being exploited by herbivores and their predators and parasites, but that it is yet to be proven whether such signals are also used by unattacked neighbouring plants.

The mechanism of induced responses is then described, looking first at the induction of primary metabolism and moving to the extensive, although recent, literature on the induction of secondary metabolites. An important part of this chapter is devoted to describing the various mechanisms for induced chemical defences, followed by control processes: synthesis, synthesis and turnover, and transport, exemplified by proteinase inhibitors, phytoalexins and nicotine respectively, with the first example allowing discussion of the ground-breaking work by Clarence (Bud) Ryan of Washington State University on these important defence proteins and their inductions. In the fourth chapter, there is an extensive tabulation of where induced resistance has been found. This is accompanied by a critical discussion on use of bioassays involving herbivores to determine the effect of induced resistance and susceptibility after initial plant damage. Here, we

also have a discussion on underlying hypotheses relating to the types of plants and the growth patterns that are likely to be associated with induced resistance against herbivores. The discussion then extends to the relationship between the extent and nature of the damage and the possible mechanism for induced resistance. Evidence for these phenomena having an influence on populations of herbivorous arthropods is tabulated, concluding with affirmation of the need for more studies at population and community levels, with longer-term experiments being employed. The next chapter is directed at the evolution of induced resistance, describing the evolutionary processes involved and how these can exploit variability in induction. An obvious advantage in induced defence is its relatively low metabolic cost compared with continuous and constitutive defence, but this issue is again debated critically with numerous examples of key studies, and not excluding other hypotheses that bear on the subject. The final chapter is devoted to prospects for using induced resistance in agriculture. Such usage would be advantageous in agricultural crop protection for all the reasons that have allowed these mechanisms to evolve so successfully, not least the low cost on plant metabolism. In addition, 'switching on' plant defences would help to conserve such systems, thereby avoiding unnecessary deployment which could promote the onset of resistance by herbivores. Although relating to prospects for the future, this final chapter is typical of the others, full of extremely valuable information and, as well as exemplifications in discussion, there is included a table providing examples of competition between individuals of the same and different species where induced defence is involved, and where the host is an agricultural crop. This book rightly recommends that, whatever approaches to crop protection are adopted, we must at least understand such important processes as those induced in plants by herbivores against further damage.

John A. Pickett

Chlorinated organic micropollutants. ed. R. E. Hester & R. M. Harrison, Royal Society of Chemistry, Cambridge, 1996, 184 pp., price UK£17.50.
ISBN 0-85404-225-3

This is the sixth of a series entitled *Issues in Environmental Science and Technology*. It contains nine chapters, each written as an up-to-date review of some aspect of environmental contamination by chlorinated organic compounds. The emphasis is on their environmental chemistry. Some aspects of environmental toxicology are also given, but this, in the main, is superficial and incomplete. The compounds considered include PCBs, PCDDs, PCDFs, and some organochlorine pesticides.

Two chapters are concerned with the environmental fate of PCBs, PCDDs, and PCDFs, one of which deals in some detail with atmospheric chemistry. One chapter focuses on human exposure to PCDDs and PCDFs. Another deals with biological uptake and transfer. A chapter is devoted to the very large subject of chlorinated pesticides; inevitably it is very superficial and incomplete, especially with regard to ecotoxicological aspects. Another presents an overview of the complexities of the ecotoxicology of chlorinated aromatic hydrocarbons in as much detail as limited space will allow. The detailed study of the fate of PCBs in the Great Lakes of N. America is presented as an integrated case study in one of the best chapters of the book. Many data are logically presented in a small space with the aid of some very useful figures. There is a good concise account of human toxicology covering much of the literature, but not dealing in any depth with mechanistic aspects.

This is a very useful text for people working in the field, giving up-to-date reviews of the environmental chemistry of these important pollutants. It should also be of some value to advanced students specialising in this area.

C. H. Walker